ZLAC8015D Servo Driver

RS485 Communication Quick Start Guide

Version	Description	Date
V1.00	First Edition	2023-9-11
V1.01	Add 20A5、20A6 Speed setting error Added the address for enabling the 2023 Speed offset function	2024/03/25

CATALOG

1、RS485 Serial Port Settings

RS485 communication of ZLAC8015D supports Modbus RTU protocol.

The driver address can be set to 0-127. The default address is 1.

For RS485 communication, ZLAC8015 has 6 optional baud rates: 9600, 19200, 38400, 57600, 115200, 128000. Baud rate could be set through software, its default value is 115200. The software cannot use a baud rate of 9600.

2、Wiring Connection

2.1 Basic Wiring Diagram

Note: The power supply can be selected from either the left or right interfaces for power supply, or it can also be powered simultaneously.
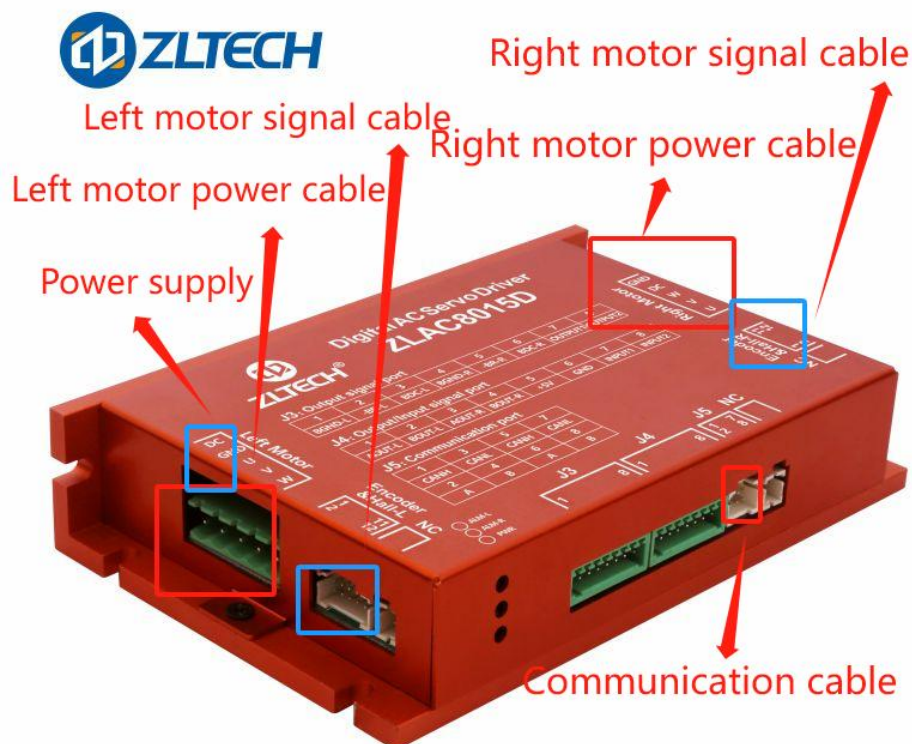
2.2 RS485 Port

Note: PIN2, PIN4 are a set of RS485 port, PIN6, PIN8 are another a set of RS485 port. These 2 sets of ports could be used at the same time, and user could use any set of port to communicate.

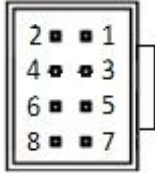| Port	Pin	Mark	Name	Function
	1	CANH	CANOPEN	
	3	CANL		
	2	A	RS485	
	4	B		
	5	CANH	CANOPEN	
	7	CANL		
	6	A	RS485	
	8	B		

3、Protocol Format

3.1 Communication Setting

Baud rate: 115200, ID: 1 (default)

3.2 RS485 Basic Format
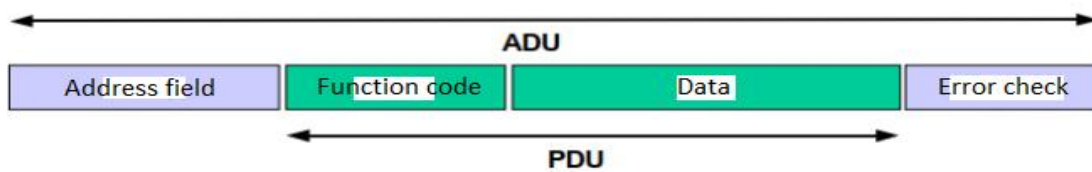
The function codes supported by ZLAC8015D are as below:

Function description	Function code	Error function code
Read multiple registers	0x03	0x83
Write single register	0x06	0x86
Writer multiple registers	0x10	0x90

3.3 Write Single Register Function Code 0x06

Send command format: Driver address + Function code + Register address + data + CRC check code.

Command	Content Description
01	Driver Address
06	Function Code
20	High 8 bits of register start address
88	Low 8 bits of register start address
00	High 8 bits of register data
64	Low 8 bits of register data
03	High 8 bits of CRC check
CB	Low 8 bits of CRC check

Return command format: Driver address + Function code + Register address + data + CRC check code.

Command	Content Description
01	Driver Address
06	Function Code
20	High 8 bits of register start address
88	Low 8 bits of register start address
00	High 8 bits of register number
64	Low 8 bits of register number
03	High 8 bits of CRC check
CB	Low 8 bits of CRC check

3.4 Write Multiple Register Function Code 0x10

Send command format: Driver address + Function code + Register address + Register number+ Number of bytes + data + CRC check code.

Command	Content Description
01	Driver Address
10	Function Code
20	High 8 bits of register start address
30	Low 8 bits of register start address
00	High 8 bits of register number
02	Low 8 bits of register number
04	Number of bytes
04	High 8 bits of data 0
00	Low 8 bits of data 0
00	High 8 bits of data 1
00	Low 8 bits of data 1
68	High 8 bits of CRC check
4A	Low 8 bits of CRC check

Return command format: Driver address + Function code + Register Register number + CRC check code.

Command	Content Description
01	Driver Address
10	Function Code
20	High 8 bits of register start address
30	Low 8 bits of register start address
00	High 8 bits of register number
02	Low 8 bits of register number
4A	High 8 bits of CRC check
07	Low 8 bits of CRC check

3.5 Read Register Function Code 0x03

Eg: Send command "Read the actual speed of motor", return "The actual speed of motor is 10RPM"

Send:

Command	Content Description
01	Driver Address
03	Function Code
20	High 8 bits of register start address
AB	Low 8 bits of register start address
00	High 8 bits of register number
02	Low 8 bits of register number
BE	High 8 bits of CRC check
2B	Low 8 bits of CRC check

Return data:

Command	Content Description
01	Driver Address
03	Function Code
04	Number of bytes read
00	High 8 bits of data 0
64	Low 8 bits of data 0
00	High 8 bits of data 1
64	Low 8 bits of data 1
BA	High 8 bits of CRC check
07	Low 8 bits of CRC check

4、Control Mode

4.1 Profile Velocity Mode

Note: Generally, users are required to use synchronous mode (synchronous mode about asynchronous function can also be achieved). The default shipping mode is synchronous mode.

Description	Send	Return
Set Profile Velocity Mode	01 06 20 0D 00 03 53 C8	01 06 20 0D 00 03 53 C8
Motor enable	01 06 20 0E 00 08 E2 0F	01 06 20 0E 00 08 E2 0F
Set up synchronization Target speed 100 RPM	01 10 20 88 00 02 04 00 64 00 64 23 9C	01 10 20 88 00 02 CA 22
Set up synchronization Target speed 100 RPM	01 10 20 88 00 02 04 FF 9C FF 9C D2 0B	01 10 20 88 00 02 CA 22
Set the left speed to -10 RPM and the right speed to 100 RPM	01 10 20 88 00 02 04 FF F6 00 64 B2 65	01 10 20 88 00 02 CA 22
Set the left speed to 10 RPM and the right speed to -100 RPM	01 10 20 88 00 02 04 00 0A FF 9C 02 33	01 10 20 88 00 02 CA 22

4.2 Profile Position Mode (Relative Position)

Description	Send	Return
Set relative Profile Position Mode	01 06 20 0D 00 01 D2 09	01 06 20 0D 00 01 D2 09
Set left motor Maximum speed 50RPM	01 06 20 8E 00 32 63 F4	01 06 20 8E 00 32 63 F4
Set right motor Maximum speed 50RPM	01 06 20 8F 00 32 32 34	01 06 20 8F 00 32 32 34
Motor enable	01 06 20 0E 00 08 E2 0F	01 06 20 0E 00 08 E2 0F
Set up synchronization target position 20480pulses	01 10 20 8A 00 04 08 00 00 50 00 00 00 50 00 E3 2C	01 10 20 8A 00 04 EB E0
Start up	01 06 20 0E 00 10 E2 05	01 06 20 0E 00 10 E2 05
Set up synchronization target position -20480pulses	01 10 20 8A 00 04 08 FF FF B0 00 FF FF B0 00 FC A3	01 10 20 8A 00 04 EB E0
Start up	01 06 20 0E 00 10 E2 05	01 06 20 0E 00 10 E2 05
Set left position -20480pulses, right position 20480pulses	01 10 20 8A 00 04 08 FF FF B0 00 00 00 50 00 B5 47	01 10 20 8A 00 04 08 FF FF B0 00 00 00 50 00 B5 47
Start up	01 06 20 0E 00 10 E2 05	01 06 20 0E 00 10 E2 05

4.3 Profile Position Mode (Absolute Position)

Description	Send	Return
Set absolute Profile Position Mode	01 06 20 0D 00 02 92 08	01 06 20 0D 00 02 92 08
Set left motor Maximum speed 50RPM	01 06 20 8E 00 32 63 F4	01 06 20 8E 00 32 63 F4
Set right motor Maximum speed 50RPM	01 06 20 8F 00 32 32 34	01 06 20 8F 00 32 32 34
Motor enable	01 06 20 0E 00 08 E2 0F	01 06 20 0E 00 08 E2 0F
Set up synchronization target position 20480pulses	01 10 20 8A 00 04 08 00 00 50 00 00 00 50 00 E3 2C	01 10 20 8A 00 04 EB E0
Start up	01 06 20 0E 00 10 E2 05	01 06 20 0E 00 10 E2 05
Set up synchronization target position -20480pulses	01 10 20 8A 00 04 08 FF FF B0 00 FF FF B0 00 FC A3	01 10 20 8A 00 04 EB E0
Start up	01 06 20 0E 00 10 E2 05	01 06 20 0E 00 10 E2 05
Set left position -20480pulses, right position 20480pulses	01 10 20 8A 00 04 08 FF FF B0 00 00 00 50 00 B5 47	01 10 20 8A 00 04 08 FF FF B0 00 00 00 50 00 B5 47
Start up	01 06 20 0E 00 10 E2 05	01 06 20 0E 00 10 E2 05

4.4 Profile Torque Mode

Description	Send	Return
Set Profile Torque Mode	01 06 20 0D 00 04 12 0A	01 06 20 0D 00 04 12 0A
Motor enable	01 06 20 0E 00 08 E2 0F	01 06 20 0E 00 08 E2 0F
Set up synchronization Target torque 2000mA	01 10 20 90 00 02 04 07 D0 07 D0 60 23	01 10 20 90 00 02 4A 25
Set up synchronization Target torque -2000mA	01 10 20 90 00 02 04 F8 30 F8 30 11 B9	01 10 20 90 00 02 4A 25
Set left torque 2000mA and right	01 10 20 90 00 02 04 07 D0 F8	01 10 20 90 00 02 4A 25

torque -2000mA	30 20 5B	
Set left torque -2000mA and right torque 2000mA	01 10 20 90 00 02 04 F8 30 07 D0 51 C1	01 10 20 90 00 02 4A 25

4.5 General Command

Master station（COB-ID:0x601）	Description
01 06 20 0E 00 07 A2 0B	Stop
01 06 20 0E 00 06 63 CB	Clear fault
01 03 20 A7 00 02 7E 28	Read left motor encoder value
01 03 20 A9 00 02 1F EB	Read right motor encoder value
01 03 20 AB 00 02 BE 2B	Read left and right motor actual speed (unit: 0.1RPM)
01 03 20 AD 00 02 5E 2A	Read left and right motor actual current (unit: 0.1A)
01 03 20 A5 00 02 DF E8	Read fault code High 16 bits: (left) Low 16 bits: (right)
01 03 20 A0 00 01 8F E8	Read software version
01 03 20 A4 00 01 CE 29	Read left and right motor temperature (unit: 1℃) High 8 bits: (left) Low 8 bits: (right)

4.6 Emergency Stop Command

Send	Receive	Description
01 06 20 0E 00 05 23 CA	01 06 20 0E 00 05 23 CA	Mtor stops and keep enabled status
01 06 20 0E 00 08 E2 0F	01 06 20 0E 00 08 E2 0F	Motor Enable (Release Emergency Stop)

※ Attention: After sending emergency stop command, user needs to send enable command to release the emergency stop status.

5、Function Setting

5.1 Alarm PWM Processing Method

Open Command: 01 06 20 1F 00 01 72 0C

Close Command: 01 06 20 1F 00 00 B3 CC

Save To EEPROM: 01 06 20 10 00 01 42 0F

Trigger Mechanism: When enabling this function, driver will enter an alarm and short-circuit the motor's power UVW (after the motor power cable UVW short-circuit, it will generate resistance during motor's rotation)

Function: To prevent the robot from sliding instantly after motor alarms

5.2 Parking Mode

Open Command: 01 06 20 0C 00 01 83 C9

Close Command: 01 06 20 0C 00 00 42 09

Trigger Mechanism: When enabling this function, the motor output current will not exceed 3A

Function: When the robot is charging or standby, enter this function to prevent the motor from over temperature problem

5.3 Speed Resolution

Setting Instruction: 01 06 20 22 00 0A A2 07 (setting range: 0-10) 10 is hexadecimal A

Save To EEPROM: 01 06 20 10 00 01 42 0F

Rule: Set to A, output speed unit: 1/10=0.1 RPM. Eg: target speed is 100 RPM, and the actual output is 10 RPM

Set to 5, output speed units: 1/5=0.2 RPM. Eg: target speed is 100 RPM, and the actual output is 20 RPM

Set to 1, output speed unit: 1/1=1 RPM. Eg: target speed is 100 RPM, and the actual output is 100 RPM

Trigger Mechanism: After enabling the testing function, it must be saved and restarted to be effective

Function: User could use more precise target speed control

5.4 I/O Emergency Stop Processing Method

5.4.1 Wiring Diagram J4
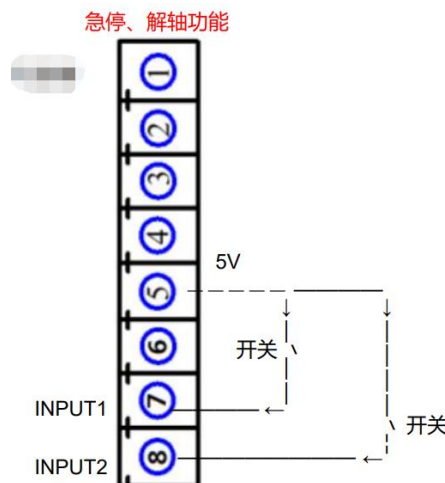
5.4.2 IO Wiring Instructions

The internal grounding of the ZLAC8015D driver is already common, so after the setting is completed, any wire can be connected to achieve the emergency stop function.

5.4.3 RS485 Command Setting

Enable input interface INPUT1 emergency stop function: 01 06 20 17 00 09 F2 08

Enable input interface INPUT2 emergency stop function: 01 06 20 18 00 09 C2 0B

Save To EEPROM: 01 06 20 10 00 01 42 0F

Command to enable IO emergency stop axis release function: 01 06 20 21 00 01 13 C0

Command to turn off IO emergency stop axis release function: 01 06 20 21 00 00 D2 00

**Save To EEPROM:** 01 06 20 10 00 01 42 0F

Trigger mechanism: After activating this function, and triggering an external emergency stop, the motor will be in an enabled state (0 speed)

Function: When the robot is in an abnormal state, it will trigger an external emergency stop.

5.5 Brake Function

5.5.1 Wiring Diagram

Note: 20V-24V DC, brake doesn't have positive or negative poles, and could be wired freely.
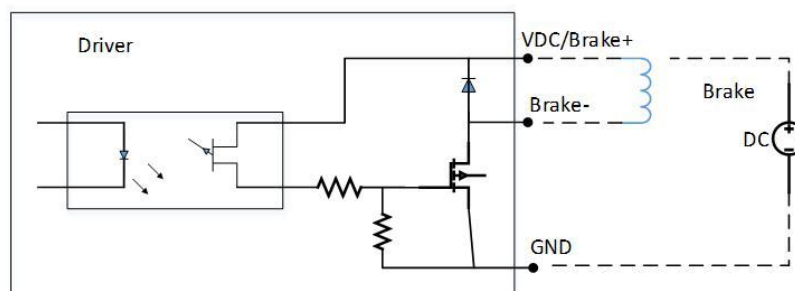
5.5.2 Brake Command Setting

Release left and right brake command: 01 06 20 1A 00 00 A3 CD

01 06 20 1B 00 00 F2 0D

Close left and right brake command: 01 06 20 1A 00 01 62 0D

01 06 20 1B 00 01 33 CD

Function: If user's motor is equipped with an external electromagnetic brake, this command can be used to release and close the brake.

6、RS485 Status Word

Index	Bit definition	Status word	Status Description
20A2h	R-bit7, bit6 L-bit15, bit14	00 00	Release shaft
		40 40	Lock shaft
		80 80	Emergency stop
		C0 C0	Alarm
	R-bit0 L-bit8	0	Stop
		1	Running

7、Fault Code

Index	Fault code	Description	Troubleshooting
	0000h	No error	Driver is normal.
	0001h	Over-voltage	1. Power supply voltage is too high

20A5h			2. Excessive back electromotive force (it is recommended to add a bleeder circuit)
	0002h	Under-voltage	1. Power supply voltage is too low 2. Check if the wiring connector is correct 3. Check if the motor parameters are correct
	0004h	Left motor over-current	1. Instantaneous current is too high 2. Motor power cable is loose
	0008h	Left motor overload	1. Check if the motor cable is loose 2. Check if the wiring and motor parameters are correct 3. Motor is stall 4. Motor or driver's problem
	0020h	Left motor encoder value is out of tolerance	1. Motor is stall 2. Encoder's problem
	0080h	Left motor reference voltage error	Reference voltage circuit issue
	0100h	Left motor EEPROM read and write error	1. Firmware is upgraded (needs to make factory settings) 2. EEPROM circuit is damaged
	0200h	Left motor hall error	1. Check if the motor cable is loose 2. Motor's problem 3. Driver's problem
	0400h	Left motor temperature is too high.	1. The motor current is too high (it is recommended to monitor motor's actual current and temperature, and reduce the current in real-time control) 2. Motor's thermistor is damaged 3. Driver's circuit is damaged
	0800h	Left motor encoder error	1. Check if the motor encoder cable is loose 2. Check if the motor encoder cable is disconnected
	2000h	Left motor speed setting error	The given speed exceeds the set rated speed
20A6h	0000h	No error	Driver is normal.
	0001h	Over-voltage	1. Power supply voltage is too high 2. Excessive back electromotive force (it is recommended to add a bleeder circuit)
	0002h	Under-voltage	1. Power supply voltage is too low 2. Check if the wiring connector is correct 3. Check if the motor parameters are correct
	0004h	Right motor over-current	1. Instantaneous current is too high 2. Motor power cable is loose
	0008h	Right motor overload	1. Check if the motor cable is loose 2. Check if the wiring and motor parameters are correct 3. Motor is stall 4. Motor or driver's problem
	0020h	Right motor encoder value is out of	1. Motor is stall

		tolerance	2. Encoder's problem
	0080h	Right motor reference voltage error	Reference voltage circuit issue
	0100h	Right motor EEPROM read and write error	1.　Firmware is upgraded (needs to make factory settings) 2. EEPROM circuit is damaged
	0200h	Right motor hall error	1. Check if the motor cable is loose 2. Motor's problem 3. Driver's problem
	0400h	Right motor temperature is too high.	1. The motor current is too high (it is recommended to monitor motor's actual current and temperature, and reduce the current in real-time control) 2. Motor's thermistor is damaged 3. Driver's circuit is damaged
	0800h	Right motor encoder error	1. Check if the motor encoder cable is loose 2. Check if the motor encoder cable is disconnected
	2000h	Right motor speed setting error	The given speed exceeds the set rated speed

8、Address Directionary

Index	Name	Description	Type	Property	Default
Common constant of left and right motors					
2000h	Communication offline time	Driver and host communication offline time setting. Unit: ms Range: 0-32767;	U16	RW/S	1000
2001h	RS485 Custom Drive Node Number	Can be set to 1-127;	U16	RW/S	1
2002h	RS485 custom communication baud rate	1：128000bps 2：115200bps 3：57600bps 4：38400bps 5：19200bps 6：9600bps	U16	RW/S	2
2003h	Input signal status	2 input signal level status Bit0-Bit1: X0-X1 input level status	U16	RO	0
2004h	Out signal status	2 output signal level status Bit0-Bit1: Y0-Y1 output status;	U16	RO	0
2005h	Reset feedback position	Used to clear feedback position 0: Invalid; 1: Feedback position reset (left); 2: Feedback position reset (right); 3:Feedback position reset (left and	U16	RW	0

		right); Do not save			
2006h	In absolute Profile Position Mode, clear the current position	Used to clear the current position in absolute position mode 0: Invalid; 1:The current position reset (left); 2:The current position reset (right); 3:The current position reset (left and right); Do not save	U16	RW	0
2007h	Electric lock shaft mode	0: Not enable, not lock the shaft; 1: Not enabled, lock the shaft;	U16	RW/S	0
2008h	Motor Max speed	Max operating speed of motor. Unit: r/min. Range: 1-1000 r/min.	U16	RW/S	1000
2009h	Register parameter settings	0: invalid. 1: Restore factory settings.	U16	RW	0
200Ah	CAN Custom Drive Node Number	Can be set to 1-127;	U16	RW/S	1
200Bh	CAN custom communication baud rate	0：1000 Kbit/s 1：500 Kbit/s 2：250 Kbit/s 3：125 Kbit/s 4：100 Kbit/s	U16	RW/S	1
200Ch	Parking mode	0: Close 1: Open	U16	RW/S	0
200Dh	Operating mode	0: Undefined; 1: Position mode(relative position mode); 2: Position mode(absolute position mode); 3: Speed mode; 4: Torque mode;	U16	RW	0
200Eh	Control word	Control word 0: Undefined 0x05: Emergency stop 0x06: Alarm Clear 0x07: Shutdown 0x08: Enable 0x10:Start (synchronous) (required in position mode) 0x11: Start (left motor) (required in position mode)	U16	RW	0

		0x12: Start (right motor) (required in position mode)			
200Fh	Synchronous/asynchronous control flag bit	0: Asynchronous control 1: Synchronous control	U16	RW	0
2010h	Whether store RW / S parameters in EEPROM synchronously	Whether the communication write function code value is updated to EEPROM. 0: Invalid; 1:Save all RW attribute parameters to EEPROM;	U16	RW	0
2011h	Quick Stop Code	Drive processing method after Quick stop command 5: Stop normally, maintain the quick stop state; 6: Reduce the speed to a sudden stop, maintain the quick stop state; 7: Emergency stop, maintain quick stop status;	U16	RW	5
2012h	Close Action Code	Drive processing after closing command 0: Invalid; 1: Normal stop, switch to the ready to switch on state;	U16	RW	1
2013h	Disable Action Code	Drive processing after disabling action commands 0: Invalid; 1: Normal stop, switch to switched on state	U16	RW	1
2014h	Halt control register	Control Word Halt Command Post Driver Processing Method 1: Normal stop, maintain Operation Enabled state; 2: Emergency deceleration stop, maintain the operation enabled state; 3: Emergency stop, maintain the operation enabled state;	U16	RW	1
2016h	Effective level of input terminal	Bit0: Input terminal X0 control position; Bit1: Input terminal X1 control position; 0: Default; 1: Level reversal;	U16	RW/S	0

		The default input terminal level rising edge or high level of the driver is valid;			
2017h	Input terminal X0 function selection	0: Undefined; 1-8: NC; 9: Emergency stop signal;	U16	RW/S	9
2018h	Input terminal X0 function selection		U16	RW/S	0
2019h	Effective level of output terminal	Bit0: Output terminal Y0 control position; Bit1: Output terminal Y1 control position; Bit2: Output terminal B0 control position; Bit3: Output terminal B1 control position; 0: Default; 1: Level reversal; The default input terminal level rising edge or high level of the driver is valid;	U16	RW/S	0
201Ah	Output terminal B0 function selection	Holding brake on/off 0: On 1: Close	U16	RW/S	0
201Bh	Output terminal B1 function selection	Holding brake on/off 0: On 1: Close	U16	RW/S	0
201Ch	Output terminal Y0 function selection	0: Undefined 1: Alarm signal; 2: Driver status signal; 3: In place signal (reserved)	U16	RW/S	0
201Dh	Output terminal Y1 function selection	0: Undefined 1: Alarm signal; 2: Driver status signal; 3: In place signal (reserved)	U16	RW/S	0
201Eh	Driver temperature protection threshold	Unit: 0.1 ° C; Range 0-1200	U16	RW/S	800
201Fh	Alarm PWM processing method	0: Close 1: Open	U16	RW/S	1
2020h	Overload handling method	0: Close 1: Open	U16	RW/S	0
2021h	I/O emergency stop processing method	0: Lock shaft 1: Not lock shaft	U16	RW/S	0
2022h	Given speed resolution	1-10 (1:1 RPM, decimal 10 is	U16	RW/S	1

		hexadecimal A: 0.1RPM)			
2023h	Velocity overshoot	0: Close 1: Open	U16	RW/S	1
Left motor independent parameters					
2030h	Encoder wires Number Setting	0-4096	U16	RW/S	1024
2031h	Offset angle between motor and Hall	Unit 1 °; Range -360-+360	I16	RW/S	0
2032h	Overload coefficient	Range 0-300, unit%	U16	RW/S	200
2033h	Rated current	Rated current output by the driver Unit 0.1A; Range 0-150	U16	RW/S	150
2034h	Peak current	Peak current output by the driver Unit 0.1A; Range 0-300	U16	RW/S	300
2035h	Overload protection time	Driver overload protection time Unit 10ms; Range 0-6553	U16	RW/S	300
2036h	Over tolerance alarm threshold	Encoder out of tolerance threshold Unit * 10 counts; Scope 1-6553	U16	RW/S	409
2037h	Speed smoothing coefficient	0-30000	U16	RW/S	1000
2038h	Current loop proportional coefficient	0-30000	U16	RW/S	600
2039h	Current loop integral gain	0-30000	U16	RW/S	300
203Ah	Feedforward output smoothing coefficient	0-30000	U16	RW/S	100
203Bh	Torque output Smooth coefficient	0-30000	U16	RW/S	100
203Ch	Speed ratio first gain Kp	0-30000	U16	RW/S	500
203Dh	Speed integral first gain Ki	0-30000	U16	RW/S	100
203Eh	Speed feedforward gain Kf	0-30000	U16	RW/S	500
203Fh	Position proportional gain Kp	0-30000	U16	RW/S	50
2040h	Position feedforward gain Kf	0-30000	U16	RW/S	200
2043h	Starting speed	Starting speed in speed mode; Unit r/min; Range 1-250/min;	U16	RW/S	1r/min
2044h	Position mode start/stop speed	Start/stop speed in position mode; Range: 1-250/min;	U16	RW	1r/min

2045h	Number of motor poles	4-64	U16	RW/S	15
2046h	Motor temperature protection threshold	Unit: 0.1 ° C; Range 0-1200	U16	RW/S	800
2047h	Speed observer coefficient 1	0-30000	U16	RW/S	1000
2048h	Speed observer coefficient 2	0-30000	U16	RW	750
2049h	Speed observer coefficient 3	0-30000	U16	RW	350
204Ah	Speed observer coefficient 4	0-30000	U16	RW	1000
Right motor independent parameters					
2060h	Encoder wires Number Setting	0-4096	U16	RW/S	1024
2061h	Offset angle between motor and Hall	Unit 1 °; Range -360-+360	I16	RW/S	0
2062h	Overload coefficient	Range 0-300, unit%	U16	RW/S	200
2063h	Rated current	Rated current output by the driver Unit 0.1A; Range 0-150	U16	RW/S	150
2064h	Peak current	Peak current output by the driver Unit 0.1A; Range 0-300	U16	RW/S	300
2065h	Overload protection time	Driver overload protection time Unit 10ms; Range 0-6553	U16	RW/S	300
2066	Over tolerance alarm threshold	Encoder out of tolerance threshold Unit * 10 counts; Scope 1-6553	U16	RW/S	409
2067h	Speed smoothing coefficient	0-30000	U16	RW/S	1000
2068h	Current loop proportional coefficient	0-30000	U16	RW/S	600
2069h	Current loop integral gain	0-30000	U16	RW/S	300
206Ah	Feedforward output smoothing coefficient	0-30000	U16	RW/S	100
206Bh	Torque output Smooth coefficient	0-30000	U16	RW/S	100
206Ch	Speed ratio first gain Kp	0-30000	U16	RW/S	500
206Dh	Speed integral first gain Ki	0-30000	U16	RW/S	100
206Eh	Speed feedforward gain Kf	0-30000	U16	RW/S	500
206Fh	Position proportional gain	0-30000	U16	RW/S	50

	Kp				
2070h	Position feedforward gain Kf	0-30000	U16	RW/S	200
2073h	Starting speed	Starting speed in speed mode; Unit r/min; Range 1-250/min;	U16	RW/S	1r/min
2074h	Position mode start/stop speed	Start/stop speed in position mode; Range: 1-250/min;	U16	RW	1r/min
2075h	Number of motor poles	4-64	U16	RW/S	15
2076h	Motor temperature protection threshold	Unit: 0.1 ° C; Range 0-1200	U16	RW/S	800
2077h	Speed observer coefficient 1	0-30000	U16	RW/S	1000
2078h	Speed observer coefficient 2	0-30000	U16	RW	750
2079h	Speed observer coefficient 3	0-30000	U16	RW	350
207Ah	Speed observer coefficient 4	0-30000	U16	RW	1000
Motion control part					
2080h	Left motor S-shaped acceleration time	Acceleration time; Range: 0-32767ms;	U16	RW	500ms
2081h	Right motor S-shaped acceleration time	Acceleration time; Range: 0-32767ms;	U16	RW	500ms
2082h	Left motor S-shaped deceleration time	Deceleration time; Range: 0-32767ms;	U16	RW	500ms
2083h	Left motor S-shaped deceleration time	Deceleration time; Range: 0-32767ms;	U16	RW	500ms
2084h	Left motor emergency stop deceleration time	Deceleration time; Range: 0-32767ms;	U16	RW	10ms
2085h	Right motor emergency stop deceleration time	Deceleration time; Range: 0-32767ms;	U16	RW	10ms
2086h	Left motor torque slope	Current/1000/second; Unit: mA/S;	U16	RW	300ms
2087h	Right motor torque slope	Current/1000/second; Unit: mA/S;	U16	RW	300ms
2088h	Left motor target speed	Target speed in speed mode; Range: -3000-3000r/min;	I16	RW	0
2089h	Right motor target speed	Target speed in speed mode; Range: -3000-3000r/min;	I16	RW	0
208Ah	Left motor target position high 16 bits	Range of total pulses in position mode operation:	I16	RW	0
208Bh		Relative: -0x7FFFFFFF~0x7FFFFFFF; Absolute:	I16	RW	0

	Left motor target position low 16 bits	-0x3FFFFFFF~0x3FFFFFFF;			
208Ch	Right motor target position high 16 bits	Range of total pulses in position mode operation:	I16	RW	0
208Dh	Right motor target position low 16 bits	Relative: -0x7FFFFFFF~0x7FFFFFFF; Absolute: -0x3FFFFFFF~0x3FFFFFFF;	I16	RW	0
208Eh	Left motor maximum speed	Maximum speed in position mode; Range: 1-1000r/min;	U16	RW	120r/min
208Fh	Right motor maximum speed	Maximum speed in position mode; Range: 1-1000r/min;	U16	RW	120r/min
2090h	Left motor target torque	Unit: mA Range: -30000~30000;	I16	RW	0
2091h	Right motor target torque	Unit: mA Range: -30000~30000;	I16	RW	0
Read only parameter					
20A0h	Software version	Factory default	U16	RO	-
20A1h	Bus voltage	Unit: 0.01V	U16	RO	0
20A2h	Status Word	Driver control motor status: R-bit7, bit6; L-bit15, bit14 00 00:Unlock shaft 40 40: Lock shaft 80 80: Emergency stop C0 C0: Alarm Motor operation status: R-bit0, L-bit8 0: Shutdown 1: Operation	U16	RO	0
20A3h	Hall input status	0-7; If 0 or 7 appears, it's a Hall error High 8 bits: (left) Low 8 bits: (right)	U16	RO	0
20A4h	Motor temperature	Unit 1 ° C; Range-55-120 High 8 bits: (left) Low 8 bits: (right)	I16	RO	-
20A5h	Last drive fault code (left)	Manufacturer customized drive error situation. 0000h: No errors; 0001h: overvoltage; 0002h: Under voltage; 0004h: overcurrent; 0008h: Overload; 0010h: Current out of tolerance; (Reserved)	U16	RO	0

		0020h: encoder out of tolerance; 0040h: Speed out of tolerance; (Reserved) 0080h: Reference voltage error; 0100h: EEPROM read and write error; 0200h: Hall error; 0400h: Motor temperature too high 0800h: Encoder error 2000h：Speed setting error（The given speed cannot exceed the rated speed）			
20A6h	Last drive fault code (right)	Manufacturer customized drive error situation. 0000h: No errors; 0001h: overvoltage; 0002h: Under voltage; 0004h: overcurrent; 0008h: Overload; 0010h: Current out of tolerance; (Reserved) 0020h: encoder out of tolerance; 0040h: Speed out of tolerance; (Reserved) 0080h: Reference voltage error; 0100h: EEPROM read and write error; 0200h: Hall error; 0400h: Motor temperature too high 0800h: Encoder error 2000h：Speed setting error（The given speed cannot exceed the rated speed）	U16	RO	0
20A7h	Actual position feedback position high 16 bits (left)	Actual position feedback, unit count; -0x7FFFFFFF~0x7FFFFFFF;	I16	RO	0
20A8h	Actual position feedback position low 16 bits (left)		I16	RO	0
20A9h	Actual position feedback position high 16 bits (right)	Actual position feedback, unit count; -0x7FFFFFFF~0x7FFFFFFF;	I16	RO	0
20AAh	Actual position feedback position low 16 bits		I16	RO	0

	(right)				
20ABh	Actual speed feedback (left)	The current speed: 0.1r/min	I16	RO	0
20ACh	Actual speed feedback (right)	The current speed: 0.1r/min	I16	RO	0
20ADh	Real time torque feedback (left)	Unit: 0.1A Range: -300~300;	I16	RO	0
20AEh	Real time torque feedback (right)	Unit: 0.1A Range: -300~300;	I16	RO	0
20AFh	Connection flag bit between software and driver	01			
20B0h	Drive temperature	Unit: 0.1 ° C Range: 550-1200	I16	RO	-
Note: U16 represents unsigned 16 bits; I16 represents signed 16 bits; U32 represents unsigned 32-bit; I32 represents signed 32-bit.					

Note:

Alarm PWM processing method: After driver enters alarm state, the upper tube is closed and the lower tube is opened (short-circuit the 3 power cables of motor).

Overload processing method: for example, motor I²t time is 20 seconds, the duration of double overload is 6 seconds, and the duration of triple overload is 4 seconds.